

# Miniature space dosimeter based on semiconductor oxides, Phase I

Completed Technology Project (2005 - 2006)



## Project Introduction

Space Micro and Clemson University have teamed for a miniature, ultra low power, space radiation dosimeter. We project this unit, "MicroRad", to be 50X smaller than the existing solution. Our ability to capitalize on COTS semiconductor devices and processes enable extremely accurate measurements at low cost. Space Micro Inc. adds their space rad hard computing to provide data logging and reporting of radiation levels. Our innovation is to utilize a normally negative response of modern microelectronics to space radiation to enable measurement of impinging particles. It is our understanding of the radiation effects physics, combined with space electronics computing and hardware which will make this R&D successful. In Phase we demonstrate technical feasibility with a lab breadboard dosimeter and device level radiation test results. We also evaluate advanced microelectronics packaging techniques (3-D stacking) to even further miniaturize in Phase II. At the end of Phase II we have developed and tested flight model dosimeter including ground-based radiation qualification. Use of space radiation dosimeters has been severely limited due to the size, power, cost of limited custom products; it is our mission to provide a commercially viable standard dosimeter for widespread application to new NASA long duration exploration and science missions.

## Anticipated Benefits

Potential NASA Commercial Applications: A miniature, accurate space radiation dosimeter is a key component for any commercial system in a radiation environment. These applications include commercial space platforms, both LEO and GEO. Telecommunication satellites, such as Intelsat and earth sensing applications e.g. (NOAA) may use a dosimeter for both platform and payloads. Terrestrial commercial applications include nuclear power plants (near core) and research accelerators e.g. (Fermi Labs). Military applications for rad hard lower cost miniature computing include strategic satellites (MILSATCOM and GPS upgrades), strategic missiles (Trident and AF upgrades), as well as many tactical weapon programs such as MDA THAAD and MKV with nuclear survival levels.



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## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Center / Facility:

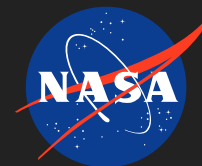
Ames Research Center (ARC)

### Responsible Program:

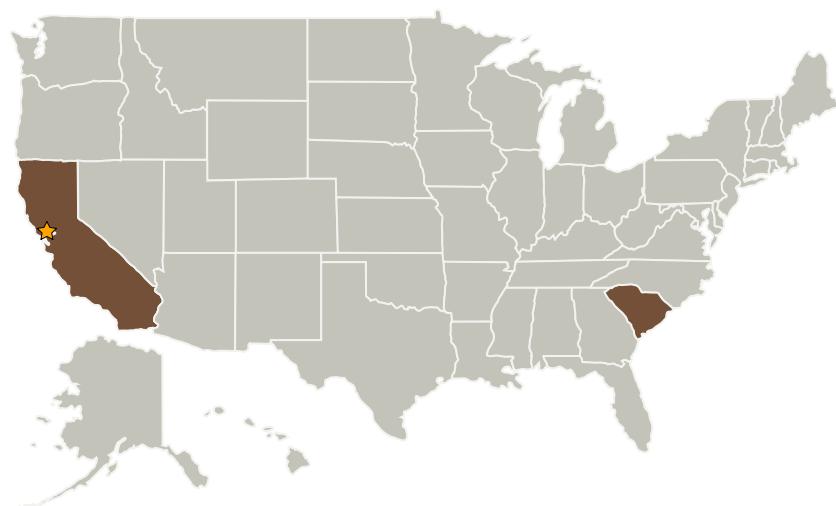
Small Business Innovation Research/Small Business Tech Transfer

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## Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★ Ames Research Center(ARC)	Lead Organization	NASA Center	Moffett Field, California
Space Micro, Inc.	Supporting Organization	Industry	San Diego, California

## Primary U.S. Work Locations

California	South Carolina
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## Project Management

### Program Director:

Jason L Kessler

### Program Manager:

Carlos Torrez

### Project Manager:

Orlando Santos

### Principal Investigators:

Dave J Strobel

David Strobel

## Technology Areas

### Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - └ TX06.5 Radiation
    - └ TX06.5.5 Monitoring Technology